REMARKS

Explanation of Amendments

Claim 1 has been amended to specify that the radiation shield comprises a plurality of rods that are "formed from a material which is thermally conducting and electrically insulating when the cryostat contains liquefied gas." No other claim has been amended, added, or deleted. No new matter has been entered by these changes. Upon entry of these amendments, claims 1-14 will remain in the application.

Claim Rejections – 35 U.S.C. §102(b)

Claims 1, 4-6, and 8-14 stand finally rejected under 35 U.S.C. §102(b) as allegedly being anticipated by WO 98/06972 ("Seton"). This rejection is again respectfully traversed.

In the Final Rejection, the examiner interpreted the term "*wherein the radiation shield comprises a plurality of rods which are thermally conducting and electrically insulating when the cryostat contains liquefied gas*" of claim 1 to encompass the arrangement disclosed in Seton, wherein the aluminium or copper strips or wires are electrically insulated from one another. Accordingly, Applicant has amended claim 1 to specify that the rods of the radiation shield are *formed from a material which is* thermally conducting and electrically insulating material when the cryostat contains liquefied gas. This is not the case in Seton as Seton's strips are formed from aluminium or copper, and are thus clearly formed from an electrically conducting material as opposed to the claimed "electrically insulating" material.

Moreover, Applicant again submits that the term "electrically insulated" as used by Seton in no way implies that either the strips or wires are themselves electrically insulating in addition to electrically conducting "when the cryostat contains liquefied gas" as claimed. Rather, the opposite is true, since the concept of electrically insulating a strip or wire which is not electrically conducting does not make sense.

Thus, while Seton discloses electrically conducting strips or wires that are electrically insulated, Seton does not teach a radiation shield comprising "a plurality of rods which are formed from a material which is thermally conducting and electrically insulating when the cryostat contains liquefied gas" as claimed. As such, Seton does not anticipate the claimed

cryostat. Withdrawal of the rejection of claims 1, 4-6, and 8-14 as being anticipated by Seton is appropriate and is respectfully solicited.

Claim Rejections – 35 U.S.C. 103(a)

Claims 1-14 stand finally rejected under 35 U.S.C. 103(a) as allegedly being unpatentable as obvious over Seton alone or alternatively over Seton in view of U.S. 2002/0024338 ("Saho") or U.S. 5,065,582 ("Seifert"). These rejections are again traversed.

Seton alone

In rejecting claims 1-14 as obvious over Seton, the Examiner contends that since Seton proposes providing the radiation shield in the form of electrically insulating strips or wires for the purpose of reducing eddy currents, it would have been obvious to one skilled in the art to provide a radiation shield formed from a plurality of insulated rods, with the intention of achieving a further reduction in eddy currents. However, Applicant submits that Seton proposes providing the radiation shield in the form of metal strips or wires solely for the purpose of reducing eddy currents, and for no other reason. Eddy currents only arise if the radiation shield is formed from an electrically conducting material. The problem simply does not arise once the decision is taken to use an electrically insulating material instead of an electrically conducting material as used by Seton. Thus, there is clearly no teaching or motivation in the art to modify Seton as the examiner alleges.

Moreover, given the fundamentally distinct mechanical properties between metals on the one hand and thermally conducting/electrically insulating materials, such as alumina, aluminium nitride, or silicon carbide on the other hand, the skilled person would not assume that a shield formed from an electrically insulating material would have to take the same form as the metal wires or strips disclosed in Seton. The skilled person would simply see no purpose or advantage associated with making the shield in this way, given that the sole reason for doing this, as presented in Seton, is to reduce eddy currents. Rather, they would look to the purpose of the radiation shield, which is to form a cylindrical surround for the cryostat, and manufacture this in the most apparently obvious way, *i.e.*, as a continuous cylinder like the alumina ceramic part 6 of the radiation shield disclosed in Seton or like the g.r.p. tube into which the strips or wires are set.

As discussed in the present specification, the production of a continuous cylinder from materials which are both thermally conductive and electrically insulating is both difficult and expensive, due to the inherent cost of such materials, and the difficulty of forming continuous sheets. The present inventors have identified that both material and manufacturing costs can be reduced by replacing the continuous cylinder radiation shield proposed in Seton with one which comprises a plurality of rods. Thus, for manufacturing reasons, specific to thermally conducting and electrically insulating materials such as alumina, aluminium nitride, or silicon carbide, it is cheaper and easier to create the radiation shield from a plurality of rods than from a continuous cylinder. This would not have been obvious to the skilled person at the time of the invention, either in view of their general knowledge, or in view of the cited prior art. The examiner has provided no findings or suggestions to suggest otherwise.

Also, as noted in the previous reply, the use of rods does not result in any perceivable reduction in eddy current losses, as compared to the continuous cylinder radiation shield disclosed by Seton. Nevertheless, the Examiner asserts that it would have been obvious to replace the continuous cylinder of Seton with a plurality of rods in view of the reference to "electrically insulated strips or wires of aluminium or copper...set lengthways into a g.r.p. tube" at page 6, lines 25-30, of Seton. However, Seton solves the problem of eddy current losses by forming the radiation shield from a material which has negligible electrical conductivity. This virtually eliminates eddy current losses from the radiation shield, to the extent that replacing the continuous cylinder with strips or wires would produce no perceptible improvement. Applicant thus submits that it would not have been obvious to one of ordinary skill in the art to form the radiation shield from strips or wires for the purpose of further decreasing eddy current losses.

Furthermore, as also previously noted, the manufacturing issues addressed by the present invention are specifically associated with materials such as sintered ceramics which are both thermally conductive and electrically insulating. With regard to metals, forming a cylinder from insulated copper or aluminium strips or wires would be no easier or cheaper than forming a continuous cylinder of the same material. Accordingly, Applicant submits that it would not have

been obvious to one skilled in the art in view of Seton that forming the radiation shield from thermally conductive, electrically insulating rods would have any advantage.

For at least these reasons, withdrawal of the obviousness rejections of claims 1-14 over Seton alone is appropriate and is solicited.

Seton + Saho or Seifert

In addition to the shortcomings in the teachings of Seton noted above, Applicant notes that Seifert does not disclose a radiation shield formed from a thermally conducting and electrically insulating material as claimed. Rather, Seifert teaches that the "screening device" is formed from "individual *electrically conductive* tracks." See the abstract, for example. Similarly, Saho teaches that the "thin line stripes" of the radiation shield are formed of "a metal material". See paragraph 29, for example. Thus, neither Seifert nor Saho provides any motivation to make a radiation shield that is formed from an electrically insulating material in the form of rods, since both of these documents relate to metal strips or tracks, which are formed in this way for the purpose of reducing eddy currents. Accordingly, it is submitted that the invention as defined by amended claim 1 is not obvious.

Finally, with regard to point 3 of the examiner's remarks at page 6 of the Final Rejection, Applicant does not dispute that the use of metal strips, wires, or rods that are electrically isolated from one another in some way will reduce eddy currents, as compared with a continuous metal cylinder. However, Applicant further submits that the use of rods formed from an electrically insulating material will give no further reduction in eddy currents, as compared with a continuous cylinder formed from the same electrically insulating material. This is because eddy currents will not form in the electrically insulating material, regardless of the form it takes. This is a matter of common general knowledge for a person skilled in this field. Moreover, Seifert and Saho, and indeed Seton, contain no contradictory evidence on this point, because all of them concern metal, *i.e.,* electrically conducting strips or wires. Reconsideration of this point by the examiner is requested.

For at least these additional reasons, Applicant further submits that it would not have been obvious for one of ordinary skill in the art to form the radiation shield disclosed in Seton with strips or tracks as disclosed in Saho or Seifert where the resulting radiation shield comprises "a plurality of rods formed from a material which is thermally conducting and electrically insulating when the cryostat contains liquefied gas" as claimed. Withdrawal of the obviousness rejections of claims 1-14 over Seton in view of Saho or Seifert is thus appropriate and is solicited.

Conclusion

For at least the reasons cited herein, claims 1-14 are believed to be allowable over the cited prior art and the application is believed to be ready for issuance. A Notice of Allowability is solicited.

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/Michael P. Dunnam/
Michael P. Dunnam
Registration No. 32,611

Woodcock Washburn LLP
Cira Centre
2929 Arch Street, 12th Floor
Philadelphia, PA 19104-2891
Telephone: (215) 568-3100
Facsimile: (215) 568-3439